PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of
Koji MAEDA, et al.

Docket No: Q66472

Appln. No.: 09/966,288

Group Art Unit: 3743

Confirmation No.: 4172

Examiner: Leonard R. Leo

Filed: October 01, 2001

For: HEAT EXCHANGER

APPELLANTS' BRIEF ON APPEAL UNDER 37 C.F.R. § 1.192

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In accordance with the provisions of 37 C.F.R. § 1.192, Appellants submit the following:

I. REAL PARTY IN INTEREST

The real party in interest is the assignee Calsonic Kansei Corporation, of Japan, by an assignment as recorded on October 1, 2001 at reel 012224, frame 0775.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellants, the Appellants' legal representative, or Assignee, which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1, 7, and 39-42, are pending, are rejected, and are the subject of this appeal.

Claims 2-6 and 8-37 have been withdrawn from consideration by the Examiner, and are not the subject of this appeal.

Claim 38 has been canceled without prejudice or disclaimer, and is not the subject of this appeal.

IV. STATUS OF AMENDMENTS

A final Office Action was mailed on July 20, 2003. Subsequently, on October 29, 2003, Appellants filed an Amendment Under 37 C.F.R. § 1.116 presenting changes to the specification, but not to the claims. This amendment was denied entry by an Advisory Action mailed on November 10, 2003. Then, on November 26, 2003, Appellants filed a SECOND Amendment Under 37 C.F.R. § 1.116, again presenting changes to the specification, but not to the claims. This SECOND amendment was denied entry by an Advisory Action mailed on December 12, 2003. Thereafter, on February 5, 2003, Appellants filed a THIRD Amendment Under 37 C.F.R. § presenting different changes to the specification, but no changes to the claims. This THIRD amendment was submitted to place this application in better form for appeal by removing the Examiner's objection to the specification. The Examiner indicated, in an Advisory action mailed on February 24, 2004 that the THIRD amendment would be entered for the purposes of appeal. Because the Advisory Action did not specifically indicate that it did, Applicants' representative telephoned the Examiner to determine whether the amendment overcame his objection to the specification. He indicated that the amendment to the specification did, indeed, overcome his objection to the specification. Thus, the claims remain as presented before the July 20 final Office Action.

V. SUMMARY OF THE INVENTION

The presently claimed invention relates to a heat exchanger, wherein a high-temperature heating medium passes from above heating medium channels, and liquid fuel is supplied to fuel

channels adjacent to the heating medium channels through partition walls, so that the liquid fuel is vaporized by heat exchange with the high-temperature heating medium.[1]

In the related art, as shown in Fig. 27 for example, there is a distribution plate 11 for supplying fuel. A large number of holes 11a are provided in the distribution plate 11 so as to penetrate the distribution plate 11 vertically. The liquid fuel B is supplied onto the plate 11 and, as a result, the liquid fuel B falls down toward the first heat exchanger body 5 thorough the large number of holes 11a, as shown in Figs. 25 and 27. Further, the liquid fuel B passes through a lower channel of the body 1, and flows upward into the second heat exchanger body 3. Thus, heat exchange is carried out between the liquid fuel B and the high-temperature combustion gas A so that the liquid fuel is turned to vapor.[2]

When the liquid fuel B is supplied to the first heat exchanger body 5, the liquid fuel B spreads all over the first heat exchanger body 5 because the large number of holes 11a are provided in the distribution plate 11. By narrowing the distance between every adjacent two of the large number of holes 11a to a certain extent, in other words, by forming a larger number of holes 11a, the liquid fuel B can be supplied to the whole area of the first heat exchanger body 5 more uniformly.[3]

However, if the distance between every adjacent two of the large number of holes 11a is too narrow, flows of the liquid fuel B through adjacent ones of the holes 11a join each other in the lower surface of the distribution plate 11. As a result, a large amount of the liquid fuel B falls down to a certain portion so that the liquid fuel B cannot be supplied uniformly to the whole

[1] Specification at page 1, 1st paragraph.

[2] Specification at page 5, 1st full paragraph.

[3] Specification at paragraph bridging pages 5 and 6.

area of the first heat exchanger body 5. Thus, there is a problem that the heat exchanger cannot exert its function satisfactorily.[4]

Accordingly, it is an object of the presently claimed invention to supply liquid fuel more uniformly to the whole area of a heat exchanger body.[5] In order to do so, with reference to Figs. 1, 5, 6A, and 6B, the presently claimed invention is embodied in a fuel supply unit 45 provided in the upper opening portion of the body 15 corresponding to the upper portion of the first heat exchanger body 23. In the fuel supply unit 45, a gap 51 through which fuel is supplied is formed between a distribution plate 47 which acts as a fuel supply plate and an upper plate 49 which is disposed above the distribution plate 47. The distribution plate 47 and the upper plate 49 are put on top of each other, as shown in the perspective view of Fig. 5. A belt-like gap formation member 53 is attached to three circumferential sides of the upper-plate-side surface of the distribution plate 47. The upper plate 49 is put on the gap formation member 53 and, thereby, the gap 51 is formed. The end portion of the distribution plate 47 in which the gap formation member 53 is not provided is bent into a downcurved L-shape. A fuel supply bracket 55 is fixed to this bent portion. Liquid fuel B is supplied to the plate 47 via supply holes 57.[6]

A large number of holes 61 through which the liquid fuel B passes are formed in the distribution plate 47 substantially correspondingly to the whole upper surface of the first heat exchanger body 23. Fig. 6A is a bottom view showing a part of the distribution plate 47, and Fig. 6B is a sectional view taken on line CC in Fig. 6A. Chamfers 63 are formed in the large number of holes 61 in the lower surface facing the first heat exchanger body 23.[7]

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[4] Specification at page 6, 1st full paragraph.

[5] Specification at page 7, 1st full paragraph.

[6] Specification at page 23, line 11 - page 24, line 5.

[7] Specification at page 24, 1st full paragraph.

When the liquid fuel B falls down into the first heat exchanger body 23 through the large number of holes 61, flows of the liquid fuel B are once collected in the outlet portions of the holes 61 by the surface tension of the liquid fuel B because the chamfers 63 are formed in the outlet portions of the holes 61. Then, the liquid fuel B falls down in the form of drops. Thus, even if the holes 61 are disposed so that adjacent ones are close to each other to a certain extent, the drops of the liquid fuel B flowing out through the adjacent holes 61 are prevented from joining each other. As a result, the liquid fuel B can be supplied to the whole area of the first heat exchanger body 23 more uniformly, so that the heat exchanger can exert its function satisfactorily.

According to one embodiment consistent with that set forth in claim 39, and as shown in Figs. 1, 5, and 6 for example, there is thus provided a heat exchanger 23 comprising: a heating medium channel 23a, 19a, a fuel channel 23b, 19b, a fuel supply plate 47 provided above the heating medium channel, the fuel supply plate having a means 61 for passing the liquid fuel by drops, and avoiding means 63 for preventing the liquid fuel drops, flown out from the means for passing, from being mixed with each other.

Figs. 7A to 11B then set forth various other structures for preventing the liquid fuel drops from being mixed with each other. See, for example, the specification at page 26, line 4 - page 29, line 13.

VI. ISSUES

Issue 1 Whether claims 1, 7, and 39-42, are unpatentable under 35 U.S.C. § 102(b) as being anticipated by the deficient disclosure in U.S. Patent No. 6,494,169, to Tsubouchi et al. (hereafter Tsubouchi).

VII. GROUPING OF CLAIMS

Issue 1 Claims 1, 7, and 40-42, stand or fall together.

Claim 39 stands or falls separately from claims 1, 7, and 40-42.

VIII. ARGUMENTS

Issue 1 The Examiner rejected claims 1, 7, and 39-42 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,494,169, to Tsubouchi et al. (hereinafter Tsubouchi). The Examiner states that Tsubouchi's nozzles inherently each have a divergent cross section and, thereby, read on the "avoiding means" or "avoiding portions" as in the presently claimed invention.[8] Appellants respectfully traverse this rejection because the Examiner's interpretation of Tsubouchi is mistaken.

Specifically, the Examiner asserts that, by definition, nozzles comprise divergent cross sections at the outlet side thereof.[9] However, according to page 1547 of Webster's Third New International Dictionary (Unabridged), published 1993, a nozzle is defined as: (1) a socket on a candlestick or sconce into which the lower end of a candle fits, (2a) a projecting vent of something : a small spout or other projecting part with an opening, and (2b) a short tube or duct that usually tapers or has a constriction, among other definitions. The tapering or diverging cross sectional aspects of a nozzle, while a possibility, are thus by no means necessary in this commonly-used definition of "nozzle". In addition, Tsubouchi's nozzles 41-45 are only shown in the Figs. as rectangularly-shaped elements, with no specific cross-sectional structure discussed in the specification. Therefore, the Examiner cannot properly characterize the prior art nozzles as "avoiding means"—as he is attempting to do in the present Office Action—without a further showing that a diverging cross section is *necessarily present* in that nozzle. *See* MPEP §§ 2131.01 (III) & 2112.

Further, Tsubouchi's nozzles 41-45 do not perform the function of "preventing the liquid fuel ... from being mixed with each other" as set forth in Appellants' claims. Instead, the nozzles 41-45 appear to do the opposite; they atomize fluid into the chamber 3, wherein the

[8] July 20 Final Office Action at page 2, 7th full paragraph.

[9] *Id.*

atomized fluid may mix together. See, for example, col. 4, lines 22-24, wherein Tsubouchi states that the "[s]pray nozzles 41 through 45 are disposed ... for supplying and atomizing the fluid ..."

In the Advisory Action as mailed on December 12, 2003, the Examiner asserts that a person having ordinary skill in the art of heat exchangers would have fundamental knowledge of thermodynamics, fluid dynamics, statics, material science and other college engineering basics.[10] The Examiner then asserts that one versed in fluid dynamics would be familiar with spray nozzles having a divergent outlet portion as evidenced by the spray nozzle 22 of US Patent 1,639,091 to Johnson (hereinafter Johnson).[11]

With respect to Tsubouchi, and Appellants' comments thereon, the Examiner is mistaken. That is, Appellants do not assert that there are no divergent spray nozzles, or that they are the first to invent divergent spray nozzles. What Appellants do argue is that the Examiner's use of Tsubouchi is wrong, and that it fails to disclose the combination of elements as set forth in Appellants' claims. Specifically, the Examiner asserts, in the final Office Action, that Tsubouchi "inherently" has divergent nozzles, and Appellants assert that it does not. To make a claim of "inherency", the reference must necessarily include the alleged feature. In this case, just because there are divergent opening spray nozzles in the world (as evidenced by Johnson) does not mean that Tsubouchi must necessarily include them. After all, there are other types of spray nozzles as well, including ones with non-divergent openings therein. That is, the mere fact that Tsubouchi *may* include a spray nozzle having a divergent opening is insufficient to establish inherency. See MPEP §2112. Accordingly, because Tsubouchi fails to disclose any particular characteristic of the nozzle, it does not necessarily have to be of the divergent-opening type.

Further, a distribution plate of the presently claimed invention is different from a "spray nozzle". In other words, the distribution plate does not spray, diffuse, or atomize, liquid from an opening portion, but includes opening portions in a region corresponding to a whole area of an

[10] December 12 Advisory Action at continuation sheet, 2nd paragraph.

[11] *Id.*

inlet of a heat exchanging portion and flows liquid of a uniform amount via each opening portion. The distribution plate of this application does not diffuse liquid from the opening portions.

The opening portions of the distribution plate of the presently claimed invention have a section shape for preventing liquid, which are flown out from the adjacent opening portions, from being mixed with each other. The opening portions of the distribution plate of the presently claimed invention do not have a section shape for diffusing liquid.

With respect to claim 39, Appellants traverse this rejection for the following additional reasons, namely, Tsubouchi (when taken either with or without Johnson) still fails to disclose all the elements as set forth and arranged in Appellants' claim.

Claim 39 sets forth a fuel supply plate having a means for passing the liquid fuel by drops, and avoiding means for preventing the liquid fuel drops from being mixed with each other.

For example, as shown in Figs. 1, 6A, and 6B, one embodiment of the present invention is a heat exchanger comprising a heating medium channel 23a, 19a, a fuel channel 23b, 19b, a fuel supply plate 47 provided above the heating medium channel, the fuel supply plate having a means 61 for passing the liquid fuel by drops, and means 63 for preventing the liquid fuel drops, flown out from the means for passing, from being mixed with each other. Due to this arrangement, when the liquid fuel B falls down onto the first heat exchanger body 23, flows of the liquid fuel B are once collected by the surface tension of the liquid fuel B because the means for preventing is formed in the outlet portions of the means for passing. Then, the liquid fuel B falls down. Thus, drops of the liquid fuel B are prevented from joining each other. As a result, the liquid fuel is supplied to the whole area of the heat exchanger more uniformly, so that the heat exchanger can exert its function satisfactorily.[12]

[12] Specification at page 25, line 16 - page 25, line 3.

In contrast to that set forth in claim 39, Tsubouchi fails to disclose the particular configuration of the nozzles 41-45. The Examiner relies on Johnson as showing the configuration of a spray nozzle. But Johnson's spray nozzle orifices 22 include only a divergent portion; they do not also include a cylindrical portion. Accordingly, Johnson's spray nozzle orifices are configured "so that the water will be discharged in a spray-like delivery in a diverging spray so as to distribute the water over a larger area than that of the filler pipe 4 ..."[13] That is, the water appears to be mixed with that from other orifices 22; it is not passed by drops, nor is it prevented from being mixed with that from other orifices 22. Accordingly, Johnson fails to teach or suggest a "means for passing the liquid ... by drops", and also fails to teach or suggest a "avoiding means for preventing the liquid ... drops ... from being mixed with each other", as set forth in Appellants' claim 39.

Further, the Examiner's interpretation of claim 39, and Johnson is incorrect. In the Advisory Action mailed on February 24, 2004, in the last paragraph on page 2, the Examiner asserts that any nozzle has a "hole ... which is read as a 'means for passing the liquid fuel.' " However, claim 39 recites "means for passing liquid ... by drops", not just means for passing fuel. And as noted above[14], Tsubouchi teaches nozzles that atomize the liquid; they do not pass the liquid by drops, as set forth in claim 39. Thus, Tsubouchi's hole does not perform the same function as recited in claim 39. Moreover, the divergent portion in Johnson does not perform the same function of "preventing liquid ... drops ... from being mixed with each other". Instead, Johnson's divergent portion acts in much the same manner as Tsubouchi's atomizing nozzles.

For at least any of the above reasons, Appellants respectfully request that the Honorable Board of Patent Appeals and Interferences reverse the Examiner's rejection of claims 1, 7, and 39-42, under 35 U.S.C. § 102(b).

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[13] Johnson at page 2, lines 4-11.

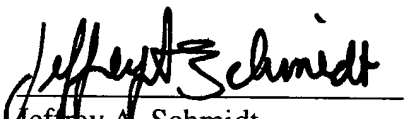
[14] Tsubouchi at col. 4, lines 22-24.

Conclusion

The present Brief on Appeal is being filed in triplicate. Unless a check is submitted herewith for the fee required under 37 C.F.R. §1.192(a) and 1.17(c), please charge said fee to Deposit Account No. 19-4880.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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APPENDIX

Claims 1, 7, and 39-42, on appeal:

1. The combination according to claim 40, wherein a circumferential edge of a fuel-outflow-side opening portion of each of the plurality of holes is chamfered to form the avoiding portions.

7. The combination according to claim 1, wherein the liquid fuel is a mixed fuel of methanol and water for producing hydrogen required for a fuel battery, and the mixed fuel vaporized is supplied to a reforming reactor for reforming methanol to produce hydrogen.

39. A heat exchanger comprising:

a heating medium channel for passing a high-temperature heating medium;

a fuel channel provided adjacent to the heating medium channel and separated from the heating medium channel through a partition wall, the fuel channel being supplied with liquid fuel from above the heating medium channel to vaporize the liquid fuel by heat exchange with the high-temperature heating medium;

a fuel supply plate provided above the heating medium channel, the fuel supply plate having a means for passing the liquid fuel by drops; and

avoiding means for preventing the liquid fuel drops, flown out from the means for passing, from being mixed with each other.

40. A heat exchanger in combination with a fuel battery, the heat exchanger comprising:

a heating medium channel for passing a high-temperature heating medium;

a fuel channel provided adjacent to the heating medium channel and separated from the heating medium channel through a partition wall, the fuel channel being supplied with liquid fuel from above the heating medium channel to vaporize the liquid fuel by heat exchange with the high-temperature heating medium;

a fuel supply plate provided above the heating medium channel, the fuel supply plate having a plurality of holes for passing the liquid fuel; and

avoiding portions for preventing the liquid fuel, flown out from adjacent ones of said plurality of holes, from being mixed with each other.

41. The combination according to claim 1, wherein each of the chamfers are outwardly extending.

42. The combination according to claim 1, wherein each of the chamfers has a periphery on the fuel-outflow-side of the fuel plate, and said periphery is larger than that of its respective hole.